

5                   **Method for mixing and homogenisation of binding agents and additives**

**Field of the invention**

The present invention relates to a method for mixing and homogenisation of binding agents and additives in particular formulated for use in the production of panels from organic fibres.

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**Background of the invention**

Known cores for doors, partitions, furniture and the like consist mostly of cardboard, chip board or wood, as it is common to use cores made from cardboard, if it concerns very easy and cheap constructions, for instance door plates; while the normal alternative, if more strength is needed, is chip board, which in return involve a more expensive and more heavy construction, for instance of plates for doors and furniture.

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A known method for production of cores of the above-mentioned type makes it possible to produce improved cores, which are easy to optimize for the actual use, and which are easy to integrate in relation to the form in the finished item, for instance profiled plates for doors or furniture, where biomass is used as filling material, for instance in form of straw and stalks, and where a binding agent is used, mainly consisting of either UF-glue (urea-formaldehyd) or MUF-glue (melamin urea-formaldehyd), together with a foaming agent.

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This known method may be such modified that the core is form-pressed between pre-fabricated shells with desired shape corresponding to the profiling of the finished door plate or furniture plate. For special situations pre-fabricated shells having asymmetric profiling may be used - for instance in such a manner that door plate or furniture plate are having a plane inner side and a profiled outer side.

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Furthermore it is known to produce a core in accordance with this known method and provided as a form-pressed mainly plate-shaped item, where the filling material consists of biomass, for instance in form of disintegrated straw and stalks, and where the binding agent mainly consists of UF-glue or MUF-glue, to which a foaming agent is added.

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This known core is provided as a form-pressed plate, which after the hardening is milled in shape for use in profiled doors and furniture plates. Or this known core may furthermore be provided as a laminate as the core is form-pressed between pre-fabricated shells with shape corresponding to the desired profiling of the finished door plate or

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furniture plate. Alternatively this known core may be such provided, that the filling material is partly disintegrated, preferably in bundles of fibre so that the core has a uniform pore structure (density profile).

5      **Brief description of the invention**

According to the invention the method for mixing and homogenisation of binding agents and additives in particular formulated for use the production of panels made from organic fibres and comprises the following method steps:

- dosing water-soluble UF/MUF resin in the range of 90% by weight,
- dosing water-soluble hardener agent in the range of 5% by weight,
- dosing not water-soluble penetration agent in the range of 2-5% of weight,
- dosing not water-soluble foaming agent in the range of 2-5% of weight,
- continuous dosing these fluids into a collective tube leading to a common dynamic mixing and homogenisation unit, and
- operation said dynamic and homogenisation unit until a homogeneous and activated resin mixture is effected, so that said mixture having a structure like an emulsion containing wax penetration micro drops.

By applying this homogeneous and activated (processed) resin mixture to organic fibres for instance in the form of disintegrated straw and stalks it is possible due to the micro sphere structure of the processed resin mixture to produce lighter particleboards compared to conventional technology, because the use of the processed resin mixture result a better distribution of the binder and a better wax penetration on disintegrated straw and stalks due to the forming of micro spheres between the fibres.

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In order to obtain the best possible homogeneous and best mutual distribution of the different fluid components by the method according to the invention use is made of automatic regulated dosing pumps for the said dosing of each of said fluids extending in a common collective tube leading to said common dynamic mixer.

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By the method according to the invention use is made of ammonium sulphate or ammonium chloride as hardener agent.

By the method according to the invention use is made of diphenylmethandiisocyanate as a penetration agent and polyols as a foaming agent.

**Brief description of the drawing**

- 5 The accompanying drawing shows a diagram illustrating the mixing and homogenisation process for the preparation of UF/MUF resins especially formulated for panel production based on organic fibres.

**Detailed description of the invention**

- 10 In the following the method according to the invention is described in more detail in connection with the following examples:

**Example 1:**

- 15 By continuous dosing use is made of automatic regulated dosing pumps for the said dosing of each of the following fluids into a collective tube leading to a common dynamic mixing and homogenisation unit: Water-soluble UF/MUF resin in the range of 90% by weight, water-soluble hardener agent in the range of 5% by weight, not water-soluble penetration agent in the range of 2-5% of weight and not water-soluble foaming agent in the range of 2-5% of weight, consequence operation said dynamic and 20 homogenisation unit until a homogeneous and activated resin mixture is effected, so that said mixture having a structure like an emulsion containing wax penetration micro drops.

**Example 2:**

- 25 By continuous dosing use is made of automatic regulated dosing pumps for the said dosing of each of the following fluids into a collective tube leading to a common dynamic mixing and homogenisation unit: Water-soluble UF/MUF resin in the range of 90% by weight, water-soluble hardener agent in the form of ammonium sulphate or ammonium chloride in the range of 5% by weight, not water-soluble penetration agent 30 in the form of diphenylmethandiisocyanate in the range of 2-5% of weight, and not water-soluble foaming agent in the form of polyols in the range of 2-5% of weight, consequence operation said dynamic and homogenisation unit until a homogeneous and activated resin mixture is effected, so that said mixture having a structure like an emulsion containing wax penetration micro drops.

Example 3:

By continuous dosing use is made of automatic regulated dosing pumps for the said  
5 dosing of each of the following fluids into a collective tube leading to a common dy-  
namic mixing and homogenisation unit: Water-soluble UF/MUF resin in the range of  
90% by weight, water-soluble hardener agent in the range of 5% by weight, not water-  
soluble combined penetration and foaming agent in the range of 3-6% of weight, con-  
sequence operation said dynamic and homogenisation unit until a homogeneous and  
10 activated resin mixture is effected, so that said mixture having a structure like an  
emulsion containing wax penetration micro drops.

In other words the described mixing and homogenisation process for UF/MUF resins  
especially formulated for panel production based on organic fibres is a combination of  
15 chemical reactions of a fluid mix and strong mechanical action of the same. The result  
is a reacted homogeneous resin mix consisting of normal non-mixable fluids.

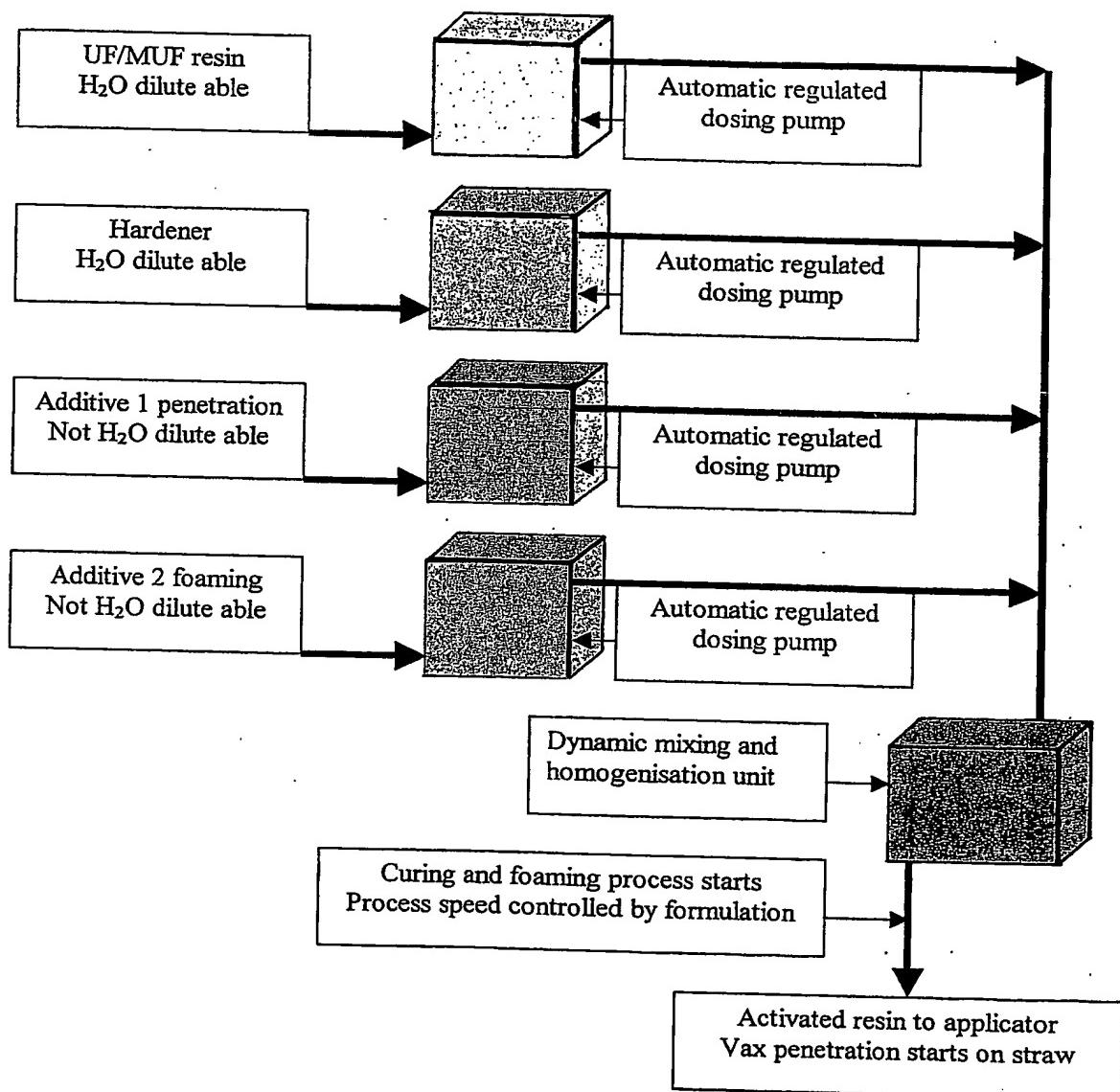
The formulation controls the following parameters:

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- Reaction speed
  - Penetration of natural wax layer of straw or organic fibres
  - Foaming effect and foaming of micro spheres

**Claims:**

1. A method for mixing and homogenisation of binding agents and additives in particular formulated for use the production of panels made from organic fibres and comprising the following method steps:
  - dosing water-soluble UF/MUF resin in the range of 90% by weight,
  - dosing water-soluble hardener agent in the range of 5% by weight,
  - dosing not water-soluble penetration agent in the range of 2-5% of weight,
  - dosing not water-soluble foaming agent in the range of 2-5% of weight,
  - continuous dosing these fluids into a collective tube leading to a common dynamic mixing and homogenisation unit, and
  - operation said dynamic and homogenisation unit until a homogeneous and activated resin mixture is effected, so that said mixture having a structure like an emulsion containing wax penetration micro drops.
- 10 2. A method according to claim 1, *characterized* in that use is made of automatic regulated dosing pumps for the said dosing of each of said fluids.
- 15 3. A method according to claim 1, *characterized* in that use is made of ammonium sulphate as hardener agent.
- 20 4. A method according to claim 1, *characterized* in that use is made of ammonium chloride as hardener agent.
- 25 5. A method according to claim 1, *characterized* in that use is made of polyurethane iso-cyanate as a combined penetration and foaming agent.
6. A method according to claim 1, *characterized* in that use is made of polyols as foaming agent.
- 30 7. A method according to claim 1, *characterized* in that use is made of diphenylmethandiisocyanate as penetration agent.

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# INTERNATIONAL SEARCH REPORT

International application No.

PCT/DK 2003/000432

## A. CLASSIFICATION OF SUBJECT MATTER

**IPC7:** C08J 9/02, C09J 5/08, C08L 61/20 // B27N 1/02, B27K 9/00, D21J 1/00,  
B29B 7/34

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

**IPC7:** C08J, C09J, C08L, B01F, B27N, B27K, D21H, B29B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

## EPO-INTERNAL, WPI DATA, PAJ, CHEM.ABS.DATA

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	FR 1365739 A (VEB LEUNA-WERKE ET AL), 25 May 1964 (25.05.1964), Examples, claims  --	1
Y	WO 0046306 A1 (SAPPI LIMITED), 10 August 2000 (10.08.2000), page 1, line 15 - page 2, line 15; page 4, line 9 - line 11, abstract, claims  --	1-7
Y	DE 2848038 A1 (VVB FURNIERE UND PLATTEN), 17 May 1979 (17.05.1979), page 3 third paragraph - page 4 third paragraph, page 7 fourth paragraph - page 9 third paragraph, figures, claims  --	1-7

Further documents are listed in the continuation of Box C.

See patent family annex.

\* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

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"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

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International application No.  
PCT/DK 2003/000432

## C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	EP 0669193 A1 (CASCO NOBEL AB), 30 August 1995 (30.08.1995), column 1, line 5 - line 16, abstract, claims, figure  --	1-7
Y	EP 0107260 A1 (METHANOL CHEMIE NEDERLAND V.O.F.), 2 May 1984 (02.05.1984), page 1, line 9 - line 24; page 2, line 13 - line 23, abstract, examples, claims  --	1-7
Y	WO 0024800 A1 (ORICA AUSTRALIA PTY.LTD.), 4 May 2000 (04.05.2000), abstract, examples, claims  --	1-7
Y	WO 0138416 A1 (DYNOCHEM NZ LIMITED), 31 May 2001 (31.05.2001), page 1, line 7 - line 27; page 3, line 6 - line 28; page 5, line 1 - line 26, abstract, claims  --	1-7
A	WO 0200804 A2 (NATIONAL STARCH AND CHEMICAL INVESTMENT HOLDING CORPORATION), 3 January 2002 (03.01.2002)  --	1-7
A	CA 2319319 A1 (FORTIN, GISELE ET AL), 11 March 2002 (11.03.2002), page 4 - page 5, figures  --	1-7
A	DE 1196368 B (DIPL.-ING. MAX HIMMELHEBER), 8 July 1965 (08.07.1965)  -----	1-7

# INTERNATIONAL SEARCH REPORT

Information on patent family members

24/12/2003

International application No.	PCT/DK 2003/000432
-------------------------------	--------------------

FR	1365739	A	25/05/1964	NONE		
WO	0046306	A1	10/08/2000	AU	3008600 A	25/08/2000
				CA	2361618 A	10/08/2000
				EP	1161498 A	12/12/2001
				ZA	200106522 A	17/03/2003
DE	2848038	A1	17/05/1979	DD	133301 A	27/12/1978
				ES	474989 A	01/04/1979
				FI	783434 A	11/05/1979
				IT	1109269 B	16/12/1985
				IT	7851829 D	00/00/0000
				PL	210831 A	16/07/1979
				SU	952306 A	23/08/1982
EP	0669193	A1	30/08/1995	SE	0669193 T3	
				AT	180432 T	15/06/1999
				AU	679054 B	19/06/1997
				AU	6439794 A	24/10/1994
				BR	9406642 A	27/02/1996
				CA	2160033 A,C	13/10/1994
				CN	1051248 B	12/04/2000
				CN	1111166 A	08/11/1995
				CZ	289501 B	13/02/2002
				CZ	9500137 A	16/08/1995
				DE	69419148 D,T	23/12/1999
				DE	69509809 D,T	25/11/1999
				DK	669193 T	08/11/1999
				DK	696884 T	10/01/2000
				EE	3227 B	15/10/1999
				EP	0696884 A,B	21/02/1996
				FI	950325 A	29/07/1995
				HU	71284 A	28/11/1995
				HU	9500257 D	00/00/0000
				JP	3348103 B	20/11/2002
				JP	7275682 A	24/10/1995
				JP	8508160 T	03/09/1996
				KR	244988 B	15/02/2000
				LV	11293 A,B	20/06/1996
				NO	315789 B	27/10/2003
				NO	950270 A	31/07/1995
				PL	175170 B	30/11/1998
				PL	177152 B	30/09/1999
				PL	306948 A	07/08/1995
				PL	310993 A	22/01/1996
				RU	2127510 C	20/03/1999
				SE	510862 C	28/06/1999
				SE	9400278 A	29/07/1995
				SK	9395 A	09/08/1995
				SK	282964 B	09/01/2003
				US	6080688 A	27/06/2000
EP	0107260	A1	02/05/1984	NL	8204144 A	16/05/1984
				NO	833915 A	30/04/1984

**INTERNATIONAL SEARCH REPORT**

Information on patent family members

24/12/2003

International application No.  
PCT/DK 2003/000432

WO	0024800	A1	04/05/2000	AU	748693 B	13/06/2002
				AU	1142400 A	15/05/2000
				AU	PP674298 D	00/00/0000
				NZ	511419 A	25/10/2002
				AU	PP986599 D	00/00/0000
				AU	PQ212599 D	00/00/0000
-----	-----	-----	-----	-----	-----	-----
WO	0138416	A1	31/05/2001	AU	1902601 A	04/06/2001
-----	-----	-----	-----	-----	-----	-----
WO	0200804	A2	03/01/2002	AU	7006001 A	08/01/2002
				US	6444232 B	03/09/2002
				US	2002197333 A	26/12/2002
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CA	2319319	A1	11/03/2002	NONE		
-----	-----	-----	-----	-----	-----	-----
DE	1196368	B	08/07/1965	NONE		
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